

CLAIMS

What is claimed is:

- 1 1. A method for fabricating a magnetic head, comprising:
2 creating a structure, comprising:
3 forming a first pole;
4 forming a cap above the first pole, empty side regions being positioned
5 laterally on opposite sides of the cap;
6 forming a dielectric gap layer above the cap;
7 forming a second pole above the gap layer; and
8 milling the structure for creating a shoulder of the first pole tapering upwardly
9 towards the cap.

- 1 2. The method as recited in claim 1, further comprising filling the side regions with
2 a material selected from a group consisting of a dielectric, a material susceptible
3 to removal by reactive ion etching, and a material susceptible to removal by
4 milling.

- 1 3. The method as recited in claim 2, further comprising performing in sequence prior
2 to milling the structure: removing exposed portions of the gap layer, and
3 removing the material used to refill the side regions.

- 1 4. The method as recited in claim 1, wherein side edges of the second pole, gap
2 layer, and cap are substantially vertically aligned.
- 1 5. The method as recited in claim 1, wherein the gap layer is alumina.
- 1 6. The method as recited in claim 1, wherein the gap layer is silicon dioxide.
- 1 7. The method as recited in claim 1, wherein the gap layer is nonmagnetic metal.
- 1 8. The method as recited in claim 1, further comprising forming a seed layer above
2 the gap layer, the second pole being plated on the seed layer.
- 1 9. The method as recited in claim 1, wherein the structure is ion milled.
- 1 10. A method for fabricating a magnetic head, comprising:
2 creating a structure, comprising:
3 forming a first pole;
4 forming a cap above the first pole, empty side regions being positioned
5 laterally on opposite sides of the cap;
6 forming a nonmagnetic metal gap layer above the cap;
7 forming a second pole above the gap layer; and
8 milling the structure for creating a shoulder of the first pole tapering upwardly
9 towards the cap.

1 11. The method as recited in claim 10, further comprising filling the side regions with
2 a material selected from a group consisting of a dielectric, a material susceptible
3 to removal by reactive ion etching, and a material susceptible to removal by
4 milling.

1 12. The method as recited in claim 11, further comprising performing in sequence
2 prior to milling the structure: removing exposed portions of the gap layer, and
3 removing the material used to refill the side regions.

1 13. The method as recited in claim 10, wherein side edges of the second pole, gap
2 layer, and cap are substantially vertically aligned.

1 14. The method as recited in claim 10, wherein the structure is ion milled.

1 15. A method for fabricating a magnetic head, comprising:
2 forming a first pole;
3 forming a cap above the first pole
4 removing opposite side regions of the cap;
5 refilling the side regions with a material selected from a group consisting of a
6 dielectric, a material susceptible to removal by reactive ion etching, and a
7 material susceptible to removal by milling;
8 forming a gap layer above the cap;

9 forming a second pole above the gap layer;
10 removing exposed portions of the gap layer;
11 removing the material used to refill the side regions, thereby exposing peripheral
12 regions of the cap; and
13 milling the cap and first pole for creating a shoulder of the first pole tapered
14 upwardly towards the cap;
15 wherein side edges of the second pole, gap layer, and cap are substantially
16 vertically aligned after the milling.

1 16. The method as recited in claim 15, wherein the exposed portions of the gap layer
2 are removed by reactive ion etching.

1 17. The method as recited in claim 15, wherein the gap layer is a dielectric.

1 18. The method as recited in claim 15, wherein the gap layer is nonmagnetic metal.

1 19. A method for fabricating a magnetic head, comprising:
2 forming a first pole;
3 forming a gap layer above the first pole;
4 forming a second pole above the gap layer;
5 forming a layer of photoresist above the second pole;
6 patterning the photoresist such that the photoresist covers areas of the gap layer
7 positioned towards the second pole;

8 removing exposed portions of the gap layer;
9 removing part of exposed portions of the first pole for forming steps in the first
10 pole on opposite sides of the photoresist;
11 removing the photoresist; and
12 milling for creating a shoulder of the first pole tapering upwardly towards the cap.

1 20. The method as recited in claim 19, wherein side edges of the second pole, gap
2 layer, and cap are substantially vertically aligned.

1 21. The method as recited in claim 19, wherein the gap layer is a dielectric.

1 22. The method as recited in claim 21, further comprising forming a seed layer above
2 the gap layer, the second pole being plated on the seed layer.

1 23. The method as recited in claim 19, wherein the gap layer is a metal.

1 24. A head formed by the method recited in claim 1.

1 25. A head formed by the method recited in claim 10.

1 26. A head formed by the method recited in claim 15.

1 27. A head formed by the method recited in claim 19.

1 28. A magnetic storage system, comprising:
2 magnetic media;
3 at least one head formed according to the method recited in claim 1;
4 a slider for supporting the at least one head; and
5 a control unit coupled to the head for controlling operation of the head.

1 29. A magnetic storage system, comprising:
2 magnetic media;
3 at least one head formed according to the method recited in claim 19;
4 a slider for supporting the at least one head; and
5 a control unit coupled to the head for controlling operation of the head.